Topic A	Requested: ☒ Oral ☐ Poster	Panel suggestion: ☐ Oral ☐ Poster

Enhanced Confinement Discharges in DIII–D with Neon Induced Edge Radiation*

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Enhanced energy confinement in discharges with impurity induced radiating power fractions, P_{rad}/P_{in}, from 50–100% have been observed in the DIII–D tokamak with neon gas puffing. The time evolution of these discharges shows the fraction of radiating power increasing after neon injection and this increase occurs primarily in the mantle region region ($\rho > 0.7$). For inner wall limited discharges there is a simultaneous drop in the heat flux conducted to the inner wall. Many of these discharges exhibit a drop, up to a factor of 2, in the SOL electron temperature.

Radiating mantle enhanced confinement discharges have been observed in the DIII–D tokamak under a variety of conditions: diverted and limited configurations with both an H–mode and L–mode edge. Confinement enhancements, $1.2 < \tau_E/\tau_{ITER89P} < 4$, have been obtained with neon gas puffing, although operation at the highest confinement values is transient. Quasi-steady-state operation has been achieved with plasma densities approaching the Greenwald density limit and with radiating power fractions of $0.5 < P_{rad}/P_{in} < 0.9$. Changes in both magnetic and electrostatic fluctuations with neon injection, measured by reciprocating probes, reflectometry, Mirnov coils, and BES, are observed.

We will discuss the similarities and differences between these DIII–D discharges and RI–mode discharges obtained in the TEXTOR tokamak. The role of the fluctuation levels in improving confinement will be discussed. The effect of neon injection on carbon sources and on impurity density profiles, namely carbon and neon, will be presented.

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